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ter evidently betrays an appreciation of Linnæus' character and ability and his words indicate that he had some expectations as to the future career of his pupil.

The further treatment of the later life and work of the great naturalist will be awaited with interest. The author remarks that no biography of Linnæus can do him justice, unless it be written on the basis of a thorough knowledge of all the sciences to the development of which he gave his attention. It is only by comparison of these sciences, in the condition in which they were before his time and in the state to which they were brought by his efforts as an investigator and by the powerful impetus of his teaching, that we can truly appreciate the greatness of his work and see its influences extending into our own time. In this age of specialization there is perhaps no one man who has such a wide knowledge of these branches as would be required; and a full account of Linnæus as a man of science would require the coöperation of several men interested in the different departments of natural history.

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#### SCIENTIFIC JOURNALS.

PHYSICAL REVIEW, VOL. III, NO. 3, NOVEMBER-DECEMBER, '95.

*Variation in Electrical Conductivity of Metallic Wires in Different Dielectrics.* By FERNANDO SANFORD.

In a paper published in 1892 Prof. Sanford presented the results of observations on the resistance of copper wires when immersed in different dielectrics, and reached the conclusion that the conductivity was to some extent dependent upon the nature of the dielectric, quite apart from incidental temperature changes, leakage, etc. The change observed in the resistance was small, amounting to not more than 0.2%. Since that time similar measurements have been undertaken by at least one other observer in the hope of verifying Prof. Sanford's conclusions, but without success. The original papers have in fact been quite generally and severely criticised.

In the present paper Prof. Sanford discusses the sources of error which have been suggested as accounting for his results, and calls attention to the fact that his conclusions have recently been qualitatively verified by Grimaldi and Catania with more accurate apparatus than he had himself used. The paper also contains the results of further observations on copper and silver wires. The amount of the resistance change was found to differ greatly with different samples of wire; but the direction of the change was always the same for a given material. Thus the resistance of copper was less in petroleum than in air, while with silver the resistance was found to be less in air. Strangely enough the behavior of a silver wire which had been copper-plated was almost identical with that of pure silver. The results obtained are certainly difficult of explanation, but are the more interesting on that account.

*A Study of the Polarization of the Light Emitted by Incandescent Solid and Liquid Surfaces.* II. By R. A. MILLIKAN.

The first half of this paper, dealing with the qualitative study of polarization by emission, has already been noticed in SCIENCE. In the present article the subject is treated quantitatively. The substances investigated were platinum, silver, gold and iron, the first two mentioned proving most satisfactory.

By means of a simple but accurate polarimeter the amount of polarization was measured at different angles of emergence. The results were then compared with the values given by Cauchy's theory of metallic reflection, upon the assumption that the polarization is due to the refraction of the rays from the interior on emerging from the surface. The agreement between the computed and observed values is quite striking, and makes it appear that refraction at emergence offers a satisfactory explanation of the phenomena in all the cases investigated. The agreement is especially good in the case of molten silver.

Observations upon the light developed by fluorescence at the surface of Uranium glass show that the light is polarized much in the same way as the rays from an incandescent surface. Here, too, the effect may be explained as a result

of refraction, and the values computed from Fresnel's theory of vitreous reflection and refraction are in close agreement with the observed amounts of polarization.

*On Ternary Mixtures III.* By W. D. BANCROFT.

The present article, which completes a series of three papers on this subject, deals with liquid mixtures in which two components are partially miscible, while the third is miscible with these in all proportions. The 'Mass Law' is found to hold in this case as well as in the case discussed in the previous articles. In support of his conclusions the author presents not only his own observations, but also the numerous results previously obtained by other observers. It is found that in general there are *four* sets of equilibria. Dr. Bancroft discusses also the question of the distinction between the solvent and a dissolvent substance, and is of the opinion that there is a fundamental difference between the two.

*On the Changes in Length Produced in Iron Wire by Magnetization.* By L. T. MOORE.

After a brief review of the work previously done on this subject the author describes experiments to determine the elongation of soft iron wire as a function of the magnetization. The apparatus used had a multiplying power of 37,000 and permitted the use of a field as high as 260. Precautions were taken to obtain uniform magnetization, and the latter was directly measured. It was therefore possible to plot the elongation in terms of the magnetization, rather than in terms of the field, as has usually been done heretofore. After correcting for the contraction due to the magnetic force between adjacent parts of the iron, the maximum elongation was found to occur at an intensity of magnetization of about 1,200. Beyond this point the elongation diminished. The effect of hardening was investigated, and measurements were also made when the wire was subjected to tension.

The number contains minor articles on the Limits of Pitch for the Human Voice, by W. Le Conte Stevens; and the New Physics Laboratory at Lille, by E. L. Nichols.

Book reviews: Hertz, *Electric Waves*; Glazebrook, *Mechanics*.

AMERICAN METEOROLOGICAL JOURNAL

DECEMBER.

*Meteorology as a University Course.* By ROBERT DEC. WARD.

The science of meteorology has been largely built up by Americans, as the names of Franklin, Redfield, Espy, Maury, Coffin, Henry, Ferrel and Loomis—known all over the world—show, and yet the study of the subject in this country is by no means as general or as systematic as it should be. The author pleads for more instruction in *general* meteorology, and advises the consideration of the various subjects in the following order: Evolution, composition and offices of the atmosphere and its relations to plants and animals; relations of earth and sun; the variations of the seasons and the distribution of temperature over the earth's surface for the year, January and July, together with a study of isanomalous and of equal annual range charts; the distribution of pressure for the year, January and July, and the resulting winds; classification of the winds; moisture of the atmosphere and precipitation; storms, including cyclones, thunderstorms and tornadoes; distribution of rainfall over the world, by seasons and for the year; weather; climate, including sanitary climatology, secular changes in climate and the relation of climate to history.

Abundant and attractive illustrations may easily be secured for such a course, as, *e. g.*, the daily weather maps, barograph and thermograph curves; temperature, pressure, wind, cloud and rainfall charts; photographs of clouds, lightning, snow crystals, damage by tornadoes, etc.

A large field of investigation is open to those who have completed a course in general meteorology, and yet who have not advanced far into physics or mathematics. Among the lines of work suggested are the following: The careful study of the climates of the different States, the effects of their topography on their rainfall, their winds and the courses of their local storms; the local effects of forests and of cultivation on rainfall; the distribution of rainfall by seasons, months and districts, and its bearing upon the times of planting and harvesting; the changes in the depth of the ground-water level, and its variations with the weather and with the season.

THE PSYCHOLOGICAL REVIEW, SEPTEMBER, 1895.

*Some Observations on the Anomalies of Self-Consciousness* (1): JOSIAH ROYCE. In this paper the author traces the development of the idea of self in the child, emphasizing the social influences which contribute to it, as worked out in earlier papers by himself and by Baldwin. He then attempts to account for the various disturbances of self-consciousness which are known to the students of mental pathology—and for the very large part which organic, visceral, and conæsthetic sensations play in these disturbances—by derangements of the associations between the social factors in the environment and these organic bodily processes, as such associations have become established in the process of learning. Organic disturbances are therefore among the most common causes of perturbances of the sense of self, since they suggest distorted and mistaken social situations; and the reverse is true: social disturbances may bring about distorted states of the common sensibility and so work changes in the sense of self.

*On Dreaming of the Dead*: HAVELOCK ELLIS. This is an account of the forms which dreams about the dead take on, with actual instances reported. It suggests lines of analogy between such dreams and processes in the early history of mankind of which anthropological theory has taken notice.

*Emotion, Desire and Interest (Descriptive)*: S. F. McLENNAN. An analytical study of the relation of emotion, desire, and interest to one another.

*Reaction-Time According to Race*: R. MEADE BACHE. In this paper Mr. Bache attempts to bring to an experimental test the theory that advance in culture and in the deliberative processes characteristic of advanced stages of civilization tends to break up the reflex processes and lengthen them. With the help of Prof. Witmer, of the University of Pennsylvania, a research was carried out upon the reaction times of ten individuals each of three races—Indians, Negroes and Whites. He found the Whites giving the longest reaction-time, as the hypothesis required, the Negroes coming next and the Indians being quickest. The relation between the Negro and the Indian he accounts for on the theory that the former has been made less quick by his ancestry of slavery,

and the Indian more quick by his method of life.

*Discussion. Pain-Nerves*: H. NICHOLS. A review of Prof. Strong's paper in the July number of the same Review. *Professor Watson on Reality and Time*: J. MARK BALDWIN. A review of a paper by the author mentioned in the title. *Psychological Literature, Notes, &c.*

NOVEMBER, 1895.

*The Confusion of Function and Content in Mental Analysis*: D. S. MILLER. This paper points out the danger and the currency of such confusion, holding that the difficulties attending certain problems which he enumerates are mainly due to it. He holds that the function of a mental content must have recognition by psychology as a matter of process, the ordinary conceptions of processes and activities getting a construction under this term 'function.' Incidentally to the main discussion there is an interesting note on Belief.

*The Origin of a 'Thing' and its Nature*: J. MARK BALDWIN. This paper is a long discussion of the problem as to how far the theory of the origin or natural history of a thing can give an adequate statement of its nature and value in the system of the world. It aims to bring to the bar the claim of the evolution theory that it explains things by describing their history in a developing series. The author propounds a distinction between the 'retrospective' and the 'prospective' points of view, claiming that the evolutionist takes exclusively the former; but since all growing, developing things are never exhausted at any stage to which their career has already attained, more career is always to be expected. This expectation of more career, of further development, supplies the 'prospective' reference of reality; and the habit of mind which looks forward rests on the same kind of experience of nature that the historical or evolution habit of mind does. And since all reality is an organized system, whose career is never finished in our experience, we must think also prospectively. Under this head the author brings the older conceptions of teleology, intuition, ethical values, the activity of volition, etc., *i. e.*, they are all illustrations of thinking in the 'prospective reference.'

Systems of philosophy are criticised from the point of view gained from this distinction. Finally these two habits of thought are connected respectively with the two principles of organic and mental development called Habit and Accommodation in the author's recent work on 'Mental Development.'

*Some Observations of the Anomalies of Self-Consciousness* (11): JOSIAH ROYCE. The conclusion of the paper with the same title in the September number. A case is given from the author's acquaintanceship illustrating the general principles laid down in the earlier paper.

*The Perception of two Points not the Space-Threshold*: GUY TAWNEY. A re-examination of the sensibility of the skin to differences of position when two points are touched at slight distances apart. A variety of semi-spacial distinctions are discovered when the two compass points are nearer than can be clearly distinguished; and the writer takes these vague judgments of size, direction, etc., to indicate that the distance just felt as two stimulations is not really the 'threshold' for space perception, as is generally supposed; but that there are indications of a confused 'extensity' sensation in connection with all touch stimulations.

*Discussion. Physical Pain*: H. R. MARSHALL. A reply to the article by Prof. Strong in the July number. *A Case of Subjective Pain*: J. H. CLAIBORNE. This note relates a case of 'a wave of pain' felt 'after an operation on the eye' simply when the absence of a friend was thought of, the pain being succeeded by pleasure when the friend was thought to be present again. *Psychological Literature, Notes, &c.*

#### BOTANICAL GAZETTE, SEPTEMBER.\*

THE body of this issue is devoted to reporting the proceedings of the Botanical Society of America, the Botanical Section (G) of the American Association for the Advancement of Science and the Botanical Club of the A. A. A. S. The address of Dr. J. C. Arthur, as vice-president of section G, is printed in full; subject, *Vegetable Physiology*.

In the department of *Noteworthy Anatomical and Physiological Researches* Borge's 'Ueber die Rhizoidenbildung bei einigen fadenförmigen

Chlorophyceen' is abstracted by Miss Stone-man, and Meyer's 'Untersuchungen über Bakterien' by Dr. Russell.

In *Briefer Articles* Frank M. Andrews describes the development of the embryo sac of *Jeffersonia diphylla*, and Lyster H. Dewey describes a new species of *Laphamia* (*L. ciliata*) from Arizona. The *Editorial* pages are devoted to a discussion of the nomenclature question apropos of the action of the Botanical Club. In *Open Letters* Mr. F. V. Coville replies to Dr. Robinson's objections in the August number to the reformed nomenclature, and Mr. C. F. Millspaugh writes against decapitalization of specific names. Three pages of *Notes and News* close the number.

#### BOTANICAL GAZETTE, OCTOBER.\*

*New or Peculiar Aquatic Fungi, I.*: ROLAND THAXTER. This is the first of a series of four papers, and deals with the genus *Monoblepharis*, of which the writer recognizes four species in this country, *M. polymorpha* Cornu, 'a second form related both to this species and *M. sphaerica*,' and two new species, *M. insignis* and *M. fasciculata*. The life history of the new forms is given, together with a description of the two last named, illustrated by a lithographic plate.

*The Regulatory Formation of Mechanical Tissue*: F. C. NEWCOMBE. Prof. Newcombe shows in this paper how the mechanical theory of growth, as determined by hydrostatic pressure within the cell and by the resistance of the cortex, gradually grew up; points out the fact that these, its two most vital supports, have been shown to be mere assumptions; and shows that growth, and especially the formation of mechanical tissues, is self regulated and is a phenomenon of irritability, a genuine reaction to strains.

*Synopsis of North American Amaranthaceæ, IV.*: EDWIN B. ULIN and WM. L. BRAY. The genus *Alternanthera* is treated in this installment. Eight species are recognized. *A. Kerberi*, from Mexico, is described as new.

In the department of *Noteworthy Anatomical and Physiological Researches* Mr. G. H. Hicks gives a résumé of Massart's 'La biologie de la végétation sur le littoral Belge;' Prof. Mac-

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\* Issued October 17, 1895. 40 pp., 1 pl.

Dougal gives a brief account of Meyer's recent volume, 'Wesen und Lebensgeschichte der Stärkekörner der höheren Pflanzen;' and Mr. Theo. Holm abstracts Bonnier's paper, 'Les plantes arctiques comparées aux mêmes espèces des Alpes et des Pyrénées.'

In *Briefer Articles* Thomas Meehan discusses the derivation of Linnæan specific names; Bessie L. Putnam describes three instances of day blooming in *Cereus grandiflorus* on account of retardation by cold weather; J. B. S. Norton reports for the first time the occurrence on Indian corn of *Ustilago Reiliana*, which was discovered in this country a few years ago on sorghum; and A. S. Hitchcock describes the cultivation of *Buchloe dactyloides* (buffalo grass) to determine the question of the arrangement of its inflorescence. The *Editorial* deals with the decline in interest in the A. A. A. S. shown in the Springfield meeting and the best methods of increasing the interest again. In *Current Literature* there is a review of the second edition of Mrs. Dana's 'How to Know the Wild Flowers.' In *Open Letters* Prof. Kellerman continues the discussion on nomenclature. *Notes and News*.

#### BOTANICAL GAZETTE, NOVEMBER.\*

*Recording Apparatus for the Study of Transpiration of Plants:* ALBERT F. WOODS. Mr. Woods has adapted Marvin's recording rain gauge, with the assistance of Prof. Marvin, to recording continuously the weight of a plant which is losing water by evaporation. In this paper he describes and figures the apparatus and its records.

*New or Peculiar Aquatic Fungi, II.:* ROLAND THAXTER. In this second paper Dr. Thaxter deals with the genera *Gonapodya* and *Myrioblepharis*. To the former he refers *Saprolegnia siliquæformis* of Reinsch, and a new species which he calls *G. polymorpha*. *Myrioblepharis* is a new genus with a single species, *M. paradoxa*. Not only descriptions but life histories of these plants are given, accompanied by a handsome plate.

*Observations on the Development of Uncinula spiralis:* B. T. GALLOWAY. Knowledge of how this fungus passes the winter and infects its host, the grape, in the spring has been want-

ing heretofore, and the investigations of Mr. Galloway were directed to these points. The development in the course of the winter and the mode of germination of the ascospores he succeeded in ascertaining, but was unable to infect grape leaves artificially. Two plates illustrate the paper.

*Notes from my Herbarium, IV.:* WALTER DEANE. In this installment Mr. Deane describes his 'baby flower press' and the manner in which he secures ephemeral and delicate flowers in good condition for the herbarium, and shows its usefulness for preserving partially dissected parts.

*Noteworthy Anatomical and Physiological Researches.* Theo. Holm contributes a notice of Andreae's 'Ueber abnorme Wurzelanschwellungen bei *Ailanthus glandulosus*,' and of several papers upon galls. Professor MacDougal writes an account of Czapek's 'Ueber Zusammenwirkung von Heliotropismus und Geotropismus.'

In *Briefer Articles* L. H. Dewey shows, with the aid of a map, the distribution of the Russian Thistle in the United States, up to October 30, 1895. Margaret F. Boynton describes some observations on the distances to which seeds are thrown or wafted by the wind; and T. D. A. Cockerell writes of Western weeds and some alien weeds in the West. In *Current Literature* there are reviews of the 'Kew Index,' just completed, the new fascicle of Gray's 'Synoptical Flora of North America,' the eleventh volume of Saccardo's 'Sylloge Fungorum,' the fourth volume of Masee's 'British Fungiflora,' together with notices of several other smaller works. In *Open Letters* the nomenclature discussion continues, with a contribution on homonyms by J. H. Barnhart, and F. A. Bather takes Mr. Millspaugh to task for some classical heresies anent decapitalization.

#### ACADEMIES AND SOCIETIES.

NATIONAL GEOGRAPHIC SOCIETY, FOURTH MEETING OF THE FRIDAY EVENING COURSE, WASHINGTON, FRIDAY, NOV. 22, 1895.

MR. E. L. CORTHELL, the well known civil engineer of New York, delivered an illustrated lecture on the Tehuantepec route and its suitability for an inter-oceanic canal.

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